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ORIGINAL

FLOOD INSURANCE STUDY

COMPLETED

38

TOWNSHIP OF SUMMIT, MICHIGAN

JACKSON COUNTY

APRIL 15, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 260575

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

TOWNSHIP OF SUMMIT,
JACKSON COUNTY, MICHIGAN

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Summit, Jackson County, Michigan, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the Township of Summit to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Commonwealth Associates Inc. for the Federal Emergency Management Agency, under Contract No. H-4729. This study was completed in March 1981.

1.3 Coordination

The initial coordination meeting was held on March 15, 1978 and attended by representatives of the Township of Summit, the Michigan Department of Natural Resources and the Study Contractor.

The limits of detailed and approximate study were determined by FEMA with community and Study Contractor consultation.

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On December 3, 1981, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Summit, Jackson County, Michigan. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction for the next five years, through March 1986.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FEMA and the Township of Summit.

The watercourses studied in detail are 4.1 miles of the Grand River, 1.1 miles of Peterson Lake Drain just upstream of the Grand River, 2.1 miles of McCain Drain, Vandercook Lake and Brown Lake. Studied in limited detail are 0.8 mile of Peterson Lake Drain near Peterson Lake and Finton Lake. An additional six miles of the Grand River and one mile of McCain Drain were studied by approximate methods.

2.2 Community Description

The Township of Summit is located in the south-central portion of lower Michigan in southwestern Jackson County. It is situated approximately 40 miles south of Lansing and 35 miles west of Ann Arbor, Michigan. The township is bordered by the Township of Blackman and the City of Jackson on the north, the Township of Liberty on the south, the Township of Spring Arbor on the west and the Townships of Leoni and Napoleon on the east. According to U.S. Census Bureau figures, the population has increased from 18,101 in 1960 to 21,754 in 1970 (Reference 1). The Township of Summit was organized by the state legislature in 1857.

The climate of southern lower Michigan varies from modified marine to continental. The mean annual temperature is 49 degrees Fahrenheit (F.), but extremes range from -21 degrees F. to 105 degrees F. The average annual precipitation of 31 inches per year is fairly well distributed throughout the year. Snow averages 37 inches per year. The average annual runoff is approximately nine inches per year (Reference 2).

The geology and topography of the Grand River basin are results of Pleistocene glaciation. Till plains, moraines, kames and esker systems of the Port Huron morainic system form the predominant surface features of the area.

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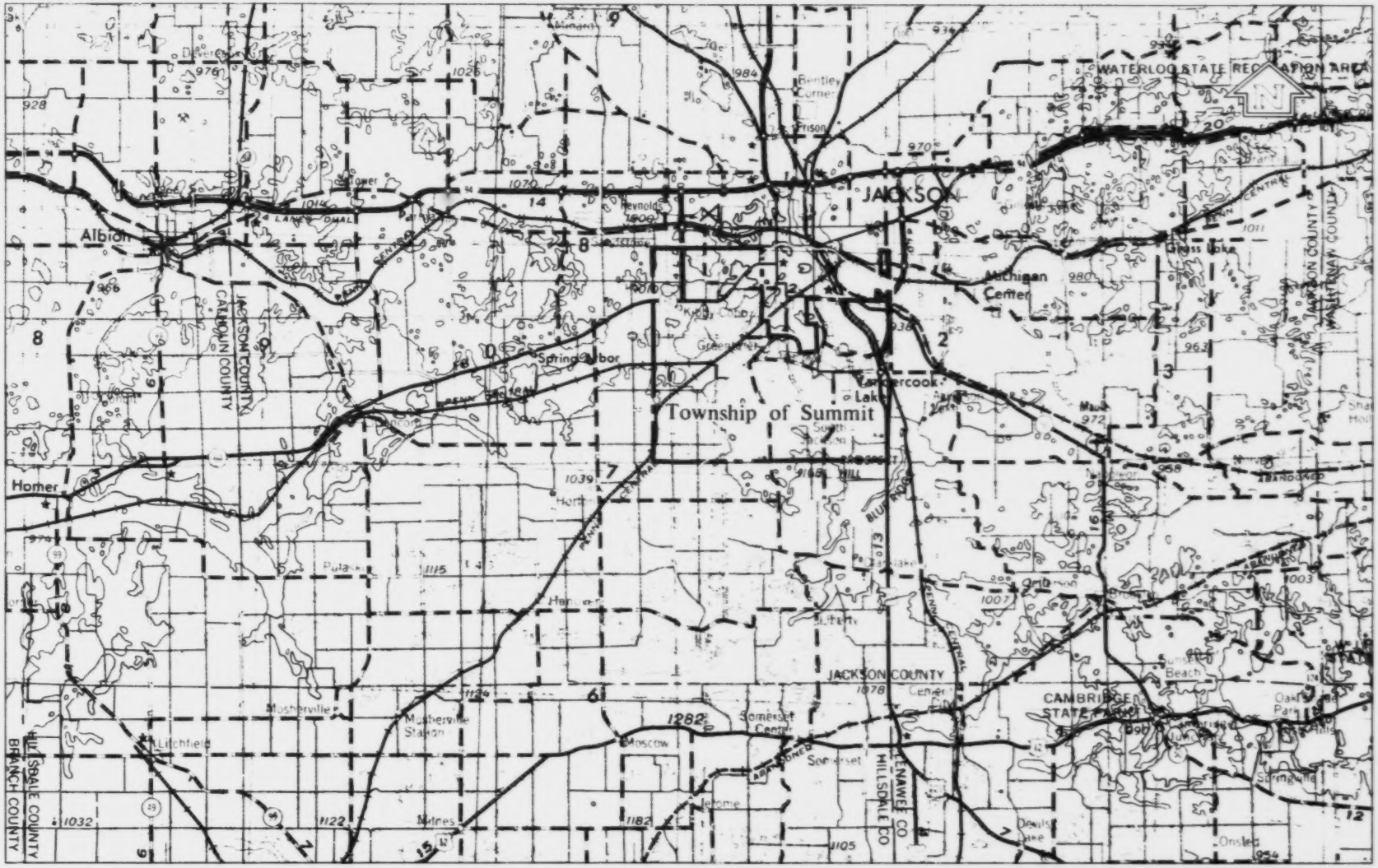

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

Most soils in the area are light, sandy loams with a moderate percentage of organic matter. They have a low water content and are generally well drained. Some irregular areas of peat soils are found around the lakes and marshes in the township (Reference 3).

The Grand River enters the Township of Summit from the southeast and flows northward through the township exiting on the northeast corner. It is one of the principal rivers in lower Michigan with its headwaters in a series of lakes in Hillsdale and Jackson Counties. From there it flows north and west to Lake Michigan at Grand Haven in Ottawa County. Its total drainage area covers approximately 5,300 square miles.

Development along the flood plain is both residential and agricultural.

2.3 Principal Flood Problems

The Township of Summit has relatively few flood problems because of its location at the upper reach of the Grand River. Floods in this area have been minor in nature. The possibility still exists, however, that a severe storm could cause major flooding. On June 20 and 21, 1937, 6.36 inches of rain fell in the City of Jackson. Four days later, 1.72 inches of rain fell producing a maximum discharge of 1,070 cubic feet per second (cfs) (recorded at the sewage treatment plant). According to historical accounts, these events caused severe flooding of streets and basements.

On June 23 through 26, 1968, 4.8 inches of rain fell in Jackson producing a maximum discharge of 1,050 cfs and an elevation of 915.44. The elevation is abnormally high because debris caused channel blockage downstream from the stream gage. The obstructions have since been removed. The elevation of 915.44 represents an approximate 100-year flood elevation and about a 25-year flood discharge. The river was 6.5 feet above the normal water-surface for this time of the year.

2.4 Flood Protection Measures

Lakes and wetlands forming in headwaters of the Grand River act as a natural control to runoff, storing stormwater as it collects and releasing it slowly over a long period of time. Downstream, the flow through the City of Jackson is partially controlled by the Jackson and Michigan Center dams. In the 1930's, a conduit was constructed in the Jackson business district to improve flow conditions. Since then, no floods of a major consequence have occurred in this area; however, off-river flooding has occurred as a result of inadequate storm drainage systems.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood

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plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 per cent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one per cent chance of annual occurrence) in any 50-year period is about 40 per cent (four in ten), and for any 90-year period, the risk increases to about 60 per cent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

Flood flows for the selected recurrence intervals for detailed and limited detail studies in the Township of Summit were calculated using the Soil Conservation Service (SCS) TR-20 Computer Program (Reference 4). The TR-20 is a hydrologic model which computes surface runoff from selected rainstorms, taking into account conditions affecting runoff, such as drainage area, slope, soil compositions, vegetation, and land use. This includes studies of the Grand River, McCain Drain, Peterson Lake Drain and Finton Lake. The hydrologic and hydraulic analyses for Finton Lake were performed by the Michigan Department of Natural Resources.

The Grand River divides into two branches at Vandercook Lake. The main branch flows through Brown Lake and the diversion flows through Sharp Lake. The two branches join together at about 500 feet downstream of the Francis Street bridge. Peak discharge-frequency relationships for the selected recurrence intervals for Grand River were obtained from the City of Jackson Flood Insurance Study (Reference 5). Necessary flood routings were performed at Vandercook Lake and Brown Lake using TR-20 as referenced above. Flow diversions were computed based on the stage-discharge relationships for both the main branch and the diversion.

For Peterson Lake Drain, the stage-discharge data for the culverts were obtained from HEC-2 models and used for the flood routing. Due to certain drainage area characteristics, such as slope, soil type and flow obstruction, portions of the drainage areas (Table 1) experience a decrease in peak discharge values.

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Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
GRAND RIVER					
At downstream study limits	188.0	920	1,220	1,340	1,640
Upstream Sharp Drain (near Sharp Lake)	63.9	170	230	255	300
Upstream Peterson Lake Drain	58.6	90	180	215	265
McCAIN DRAIN					
At downstream study limit	6.3	234	312	360	520
At State Highway 60	5.4	212	283	326	471
At McCain Road	4.8	196	262	302	436
At Spring Arbor Road	1.7	158	236	296	484
PETERSON LAKE DRAIN					
At Grand River	4.6	97	107	114	138
Just upstream Horton Road	4.3	173	248	304	487
Downstream of Conrail, downstream crossing	3.3	101	109	116	139
At Conrail, upstream crossing	2.1	167	N/A	276	N/A
At abandoned railroad	1.5	94	N/A	149	N/A
Upstream Peterson Lake	0.7	84	N/A	145	N/A

Table 2 lists the determined elevations for the lakes in this study.

TABLE 2 - SUMMARY OF ELEVATIONS

LOCATION	ELEVATIONS (NGVD) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FINTON LAKE	959.3	N/A	959.7	N/A
VANDERCOOK LAKE	947.2	948.3	948.6	949.0
BROWN LAKE	946.7	947.4	947.7	948.0
PETERSON LAKE	965.7	N/A	967.5	N/A

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3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along each flooding source studied in detail.

For sources studied in detail, the 10-, 50-, 100- and 500-year flood flows were used in the hydraulic analysis, while only 10- and 100-year flood flows were used in the hydraulic analysis for limited detail studies.

Flow cross sections for all detail and limited detail studies in the Township of Summit were surveyed in November 1978 and May 1980.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Roughness coefficients (Manning's "n") were chosen by engineering judgment and based on field observations. Values for the Grand River were 0.02 to 0.045 for natural channels and 0.08 for stream overbanks. For the Peterson Lake Drain just upstream of the Grand River, values were 0.025 to 0.04 for natural channels and 0.08 for stream overbanks. Roughness coefficients for McCain Drain were 0.04 to 0.05 for natural channel and 0.06 to 0.13 for stream overbanks. Values for Peterson Lake Drain, located near Peterson Lake, were 0.03 to 0.04 for channel and 0.08 and 0.1 for overbanks.

Starting water-surface elevations for the Grand River at the downstream study limit were interpolated from a rating curve based on stage-discharge data derived from the SCS publication "Flood Hazard Analyses for the Upper Grand River, Jackson County, Michigan" (Reference 2). Starting water elevations for the Peterson Lake Drain were based on the computed water elevations for the above Grand River reaches. For McCain Drain and Peterson Lake Drain located upstream of Peterson Lake, the starting water elevation was specified by the slope-area method.

Water-surface elevations of floods of selected recurrence intervals were computed through the use of the U.S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 6).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

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All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps at a scale of 1:24000, with contour intervals of 10 feet (Reference 7).

For portions of the Grand River and McCain Drain studied by approximate methods, the boundary of the 100-year flood was developed from normal depth calculations or from information extracted from topographic maps. The remaining areas studied by approximate methods were obtained from the Flood Hazard Boundary Map (Reference 8).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map. Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood

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heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In Michigan though, under Michigan Act 245, Public Acts of 1929, as amended by Act 167, Public Acts of 1968 (Reference 9), encroachment in the flood plain is limited to that which will cause only an insignificant increase in flood heights. Thus, at the recommendation of the Bureau of Water Management, a floodway having no more than a 0.1-foot surcharge has been delineated for this study.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 3).

As shown on the Flood Boundary and Floodway Map, the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

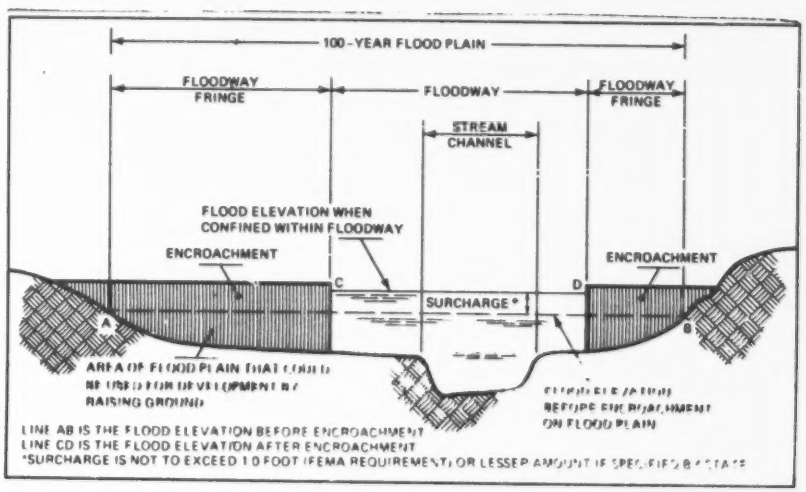
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE
GRAND RIVER							
A	2100	1020/940[4]	5852	0.2	935.0	935.0	0.0
B	27,794	26	131	1.9	945.2	945.2	0.0
C	28,629	21	82	3.1	945.4	945.4	0.0
D	32,750	65	249	1.0	947.0	946.9	0.1
E	36,480	31	70	3.1	947.4	947.3	0.1
F	41,081	1294	2093	0.1	947.8	947.7	0.1
PETERSON LAKE DRAIN							
A	200[2]	782	928	0.1	947.0	947.0	0.0
B	1240[2]	6	17	6.7	947.4	947.4	0.0
C	2180[2]	5	27	4.3	949.7	949.7	0.0
D	3411[2]	6	29	3.9	951.2	951.2	0.0
E	5606[2]	581	1087	0.3	951.8	951.8	0.0
F	7006[2]	665	313	0.4	952.0	952.0	0.0
MC CAIN DRAIN							
A	0[3]	308/180[4]	475	0.8	955.7	955.7	0.0
B	2301[3]	14	81	4.4	957.1	957.0	0.1
C	2489[3]	14	85	4.2	957.1	957.0	0.1
D	3853[3]	22	130	2.3	958.6	958.5	0.1
E	5078[3]	410	452	0.7	959.0	958.9	0.1
F	6718[3]	11	39	7.6	960.0	959.9	0.1
G	8512[3]	17	110	2.7	962.2	962.2	0.0
H	9130[3]	161	254	1.2	962.4	962.4	0.0
I	9423[3]	168	281	1.1	962.6	962.5	0.1
J	10,849[3]	375	538	0.6	963.1	963.0	0.1

[1]FEET ABOVE LOSEY AVENUE
[2]FEET ABOVE MOUTH
[3]FEET ABOVE CORPORATE LIMITS
[4]TOTAL WIDTH / WIDTH WITHIN CORPORATE LIMITS

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

FLOODWAY DATA

GRAND RIVER - PETERSON LAKE DRAIN - MC CAIN DRAIN

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Township of Summit.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 per cent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the Township of Summit are shown on the Flood Profiles and are summarized in Table 4, "Flood Insurance Zone Data."

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Township of Summit was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

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Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zones A1-A3:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 4, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of Summit is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

A report published in December 1976 entitled "Flood Hazard Analyses for the Upper Grand River, Jackson County, Michigan," documents historical flooding in the study area covered by this report (Reference 2). The portion of the Grand River located 2,100 feet upstream of Losey Avenue which was studied in detail matches exactly with the Flood Insurance Study for the City of Jackson (Reference 5). Detailed flooding from the Grand River northeast of Probert Road and approximate flooding from the Grand River west of Francis Street is delineated in the Township of Summit but not in Jackson. Differences are justified since this portion of the Grand River in Jackson is contained within a park and is therefore not viewed as a flooding hazard.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
GRAND RIVER							
REACH 1	0003	–1.6	–0.2	0.6	015	A3	VARIES–SEE MAP
REACH 2	0005,0008	–0.9	–0.2	0.4	010	A2	VARIES–SEE MAP
PETERSON LAKE DRAIN							
REACH 1	0005	–0.8	–0.3	0.4	010	A2	VARIES–SEE MAP
REACH 2	0004,0005	–0.6	–0.3	0.7	005	A1	VARIES–SEE MAP
REACH 3	0004,0007	–1.4	N/A	N/A	015	A3	VARIES–SEE MAP
REACH 4	0007	–0.3	N/A	N/A	005	A1	VARIES–SEE MAP
MC CAIN DRAIN							
REACH 1	0001,0004	–0.9	–0.3	1.1	010	A2	VARIES–SEE MAP

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

FLOOD INSURANCE ZONE DATA

GRAND RIVER - PETERSON LAKE DRAIN - MC CAIN DRAIN

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
FINTON LAKE							
REACH 1	0008	–0.4	N/A	N/A	005	A1	960
VANDERCOOK LAKE							
REACH 1	0008	–1.4	–0.3	0.4	015	A3	949
BROWN LAKE							
REACH 1	0008	–1.0	–0.3	0.3	010	A2	948

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

FLOOD INSURANCE ZONE DATA

FINTON LAKE - VANDERCOOK LAKE - BROWN LAKE

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A Flood Hazard Boundary Map has been published for the community (Reference 8). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, (24th Floor), Chicago, Illinois 60606.

8.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population, Number of Inhabitants, Michigan, Washington, D.C., 1971.

2. U.S. Department of Agriculture, Soil Conservation Service, Flood Hazard Analyses for the Upper Grand River, Jackson County, Michigan, December 1976.

3. ————, Soil Survey of Jackson County, Michigan, 1926.

4. ————, TR-20 Computer Program for Project Formulation, March 1969.

5. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Jackson, Michigan, February 1977.

6. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program 723-X6-L202A, HEC-2 Water-Surface Profiles, Davis, California, December 1968 with updates.

7. U.S. Geological Survey, Topographic Maps, Jackson South, Michigan Quadrangle and Michigan Center, Scale 1:24000, Contour Interval 10 feet: Michigan Quadrangle, 1971.

8. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Summit, Michigan, September 1975.

9. State of Michigan, Flood Plain Control Act of 1968, Act 245, P.A. 1929 as amended by Act 167, P.A. 1968, Michigan Water Resources Commission, Lansing, Michigan, 1968.

Romig, Walter, Michigan Place Names, The History of the Founding and Naming of More Than Five Thousand Past and Present Michigan Communities, Grosse Pointe, Michigan, 1972.

U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40, Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 years, May 1961.

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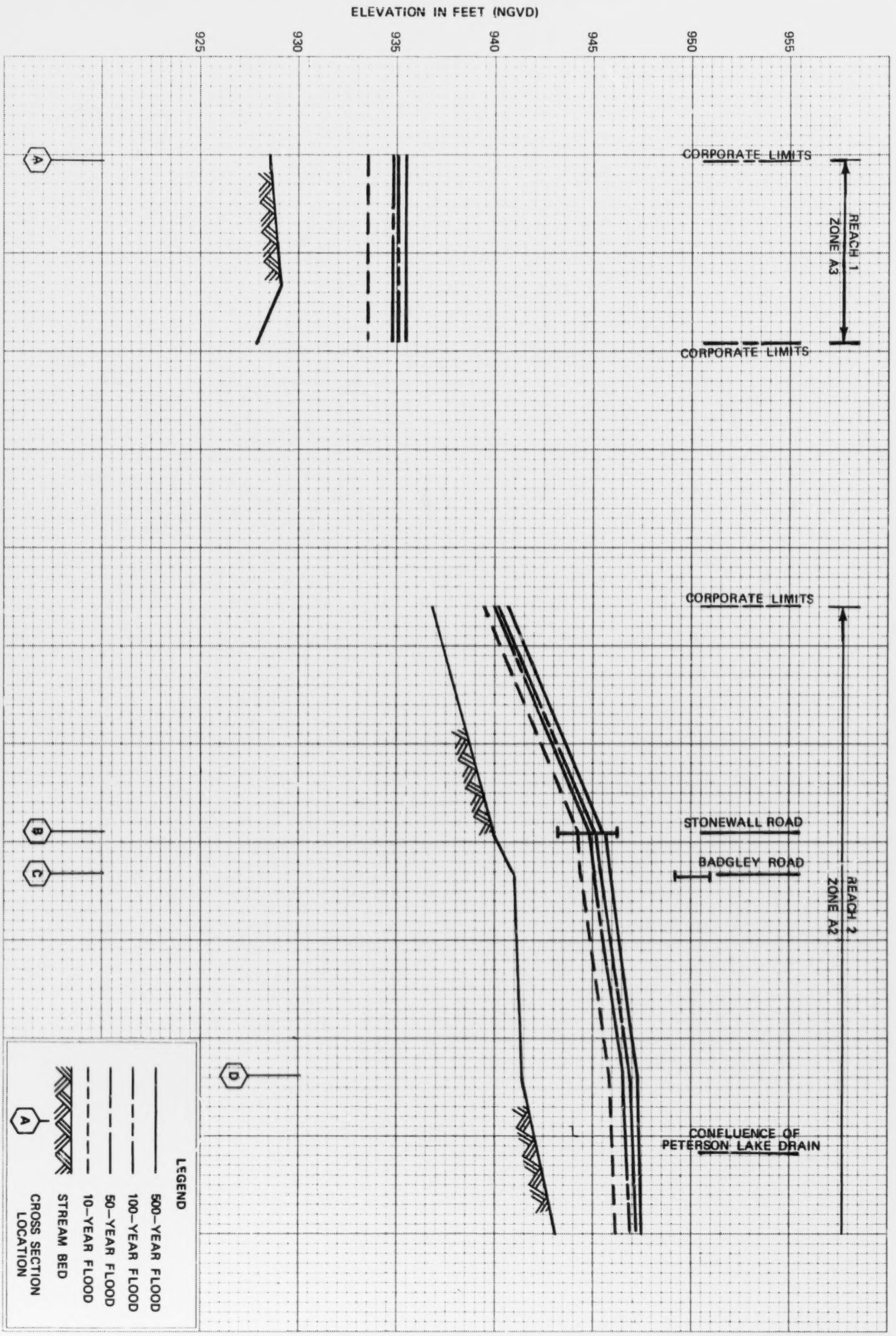

01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWNSHIP OF SUMMIT, MI** (JACKSON CO.)	**FLOOD PROFILES** **GRAND RIVER**

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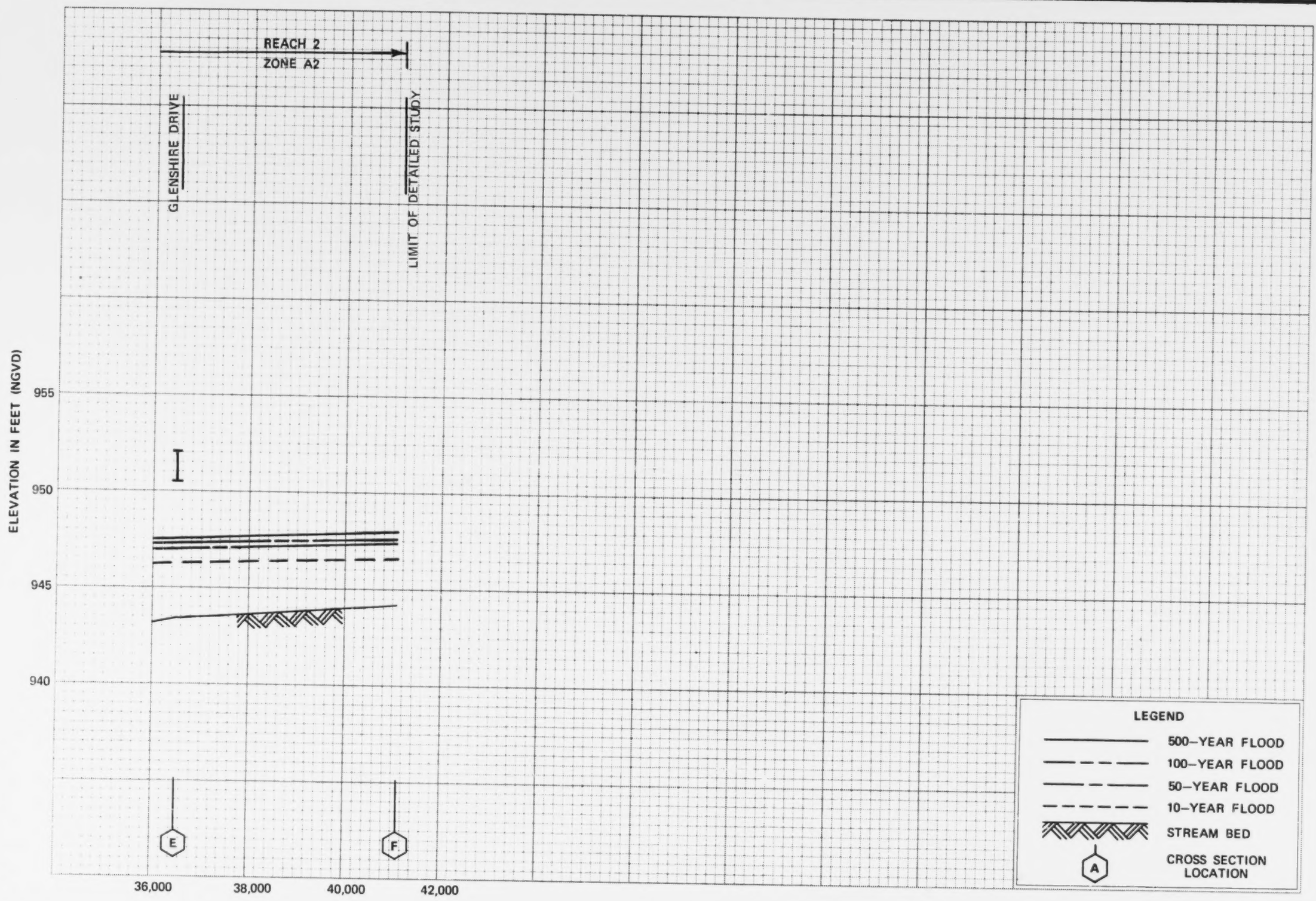

FLOOD PROFILES

GRAND RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

02P

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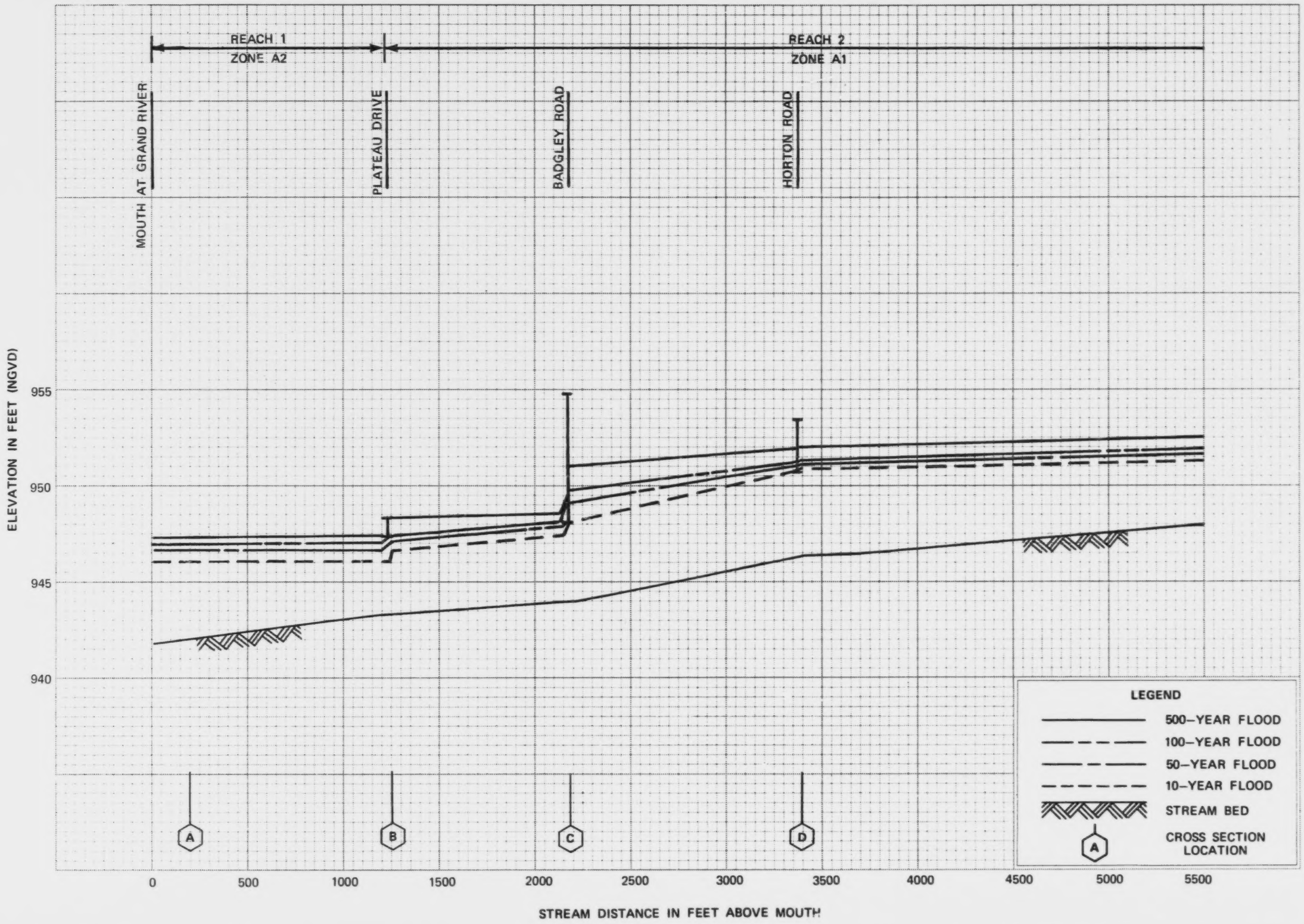

FLOOD PROFILES

PETERSON LAKE DRAIN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
(JACKSON CO.)

03P

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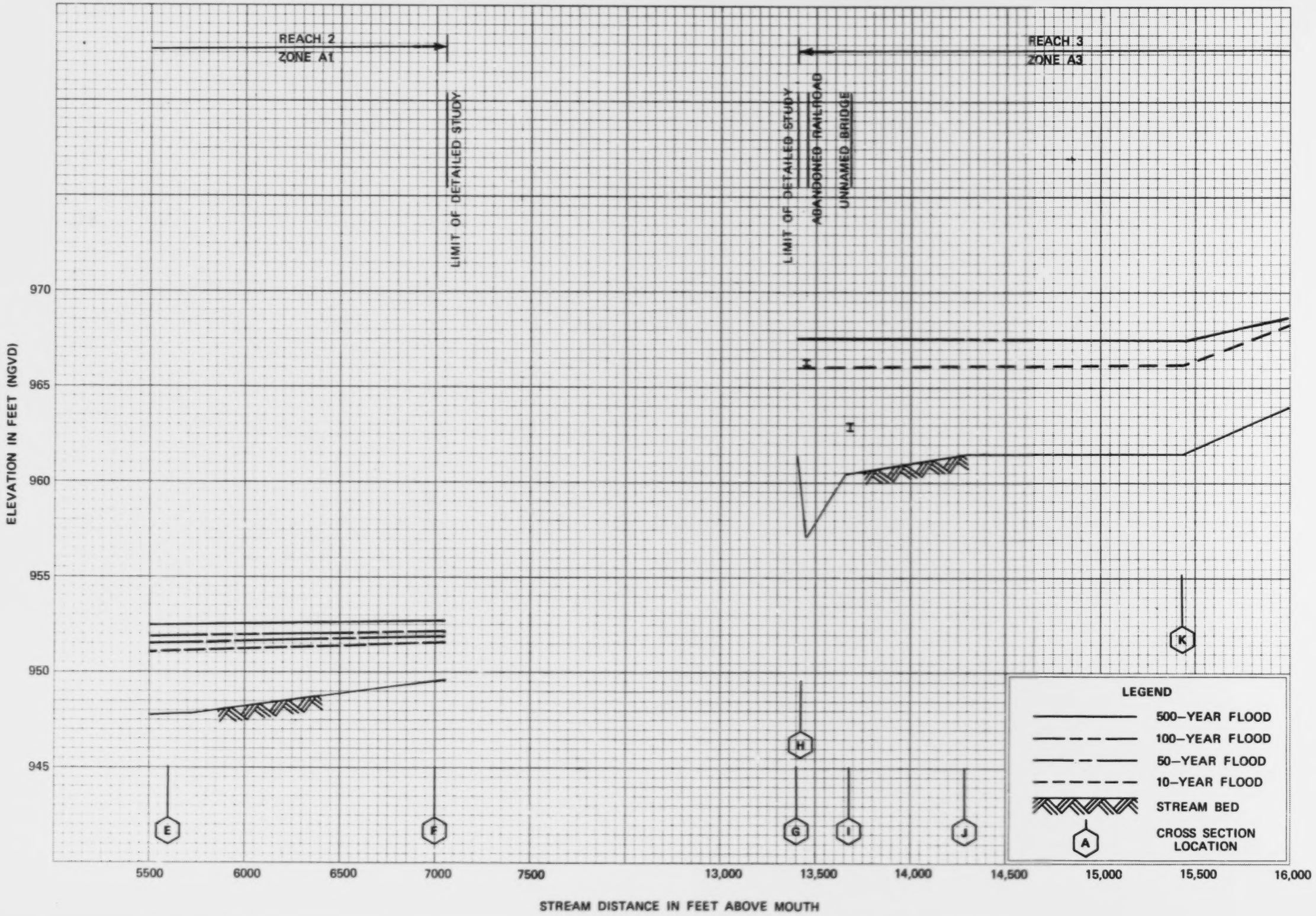

FLOOD PROFILES

PETERSON LAKE DRAIN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF SUMMIT, MI
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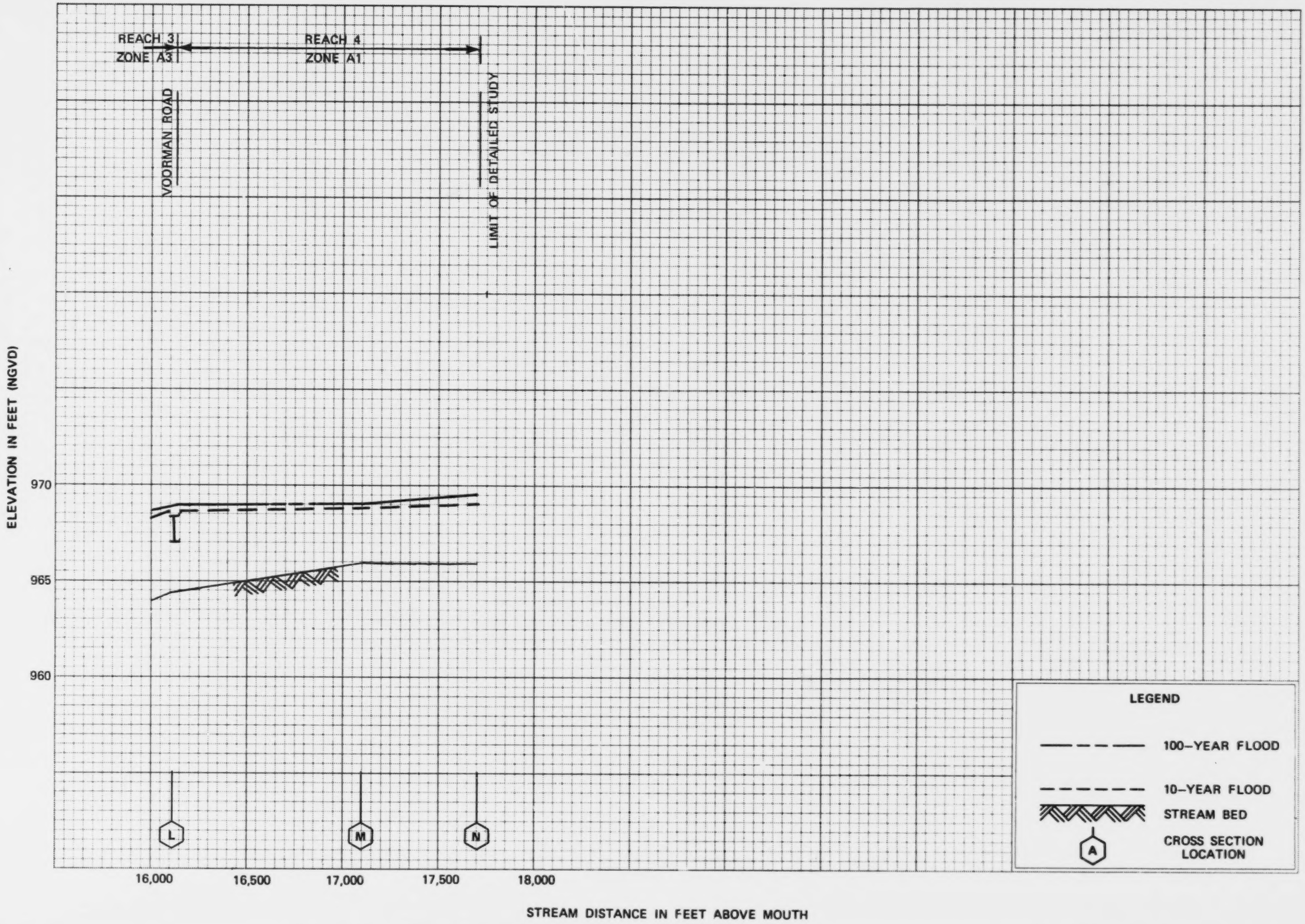

FLOOD PROFILES

PETERSON LAKE DRAIN

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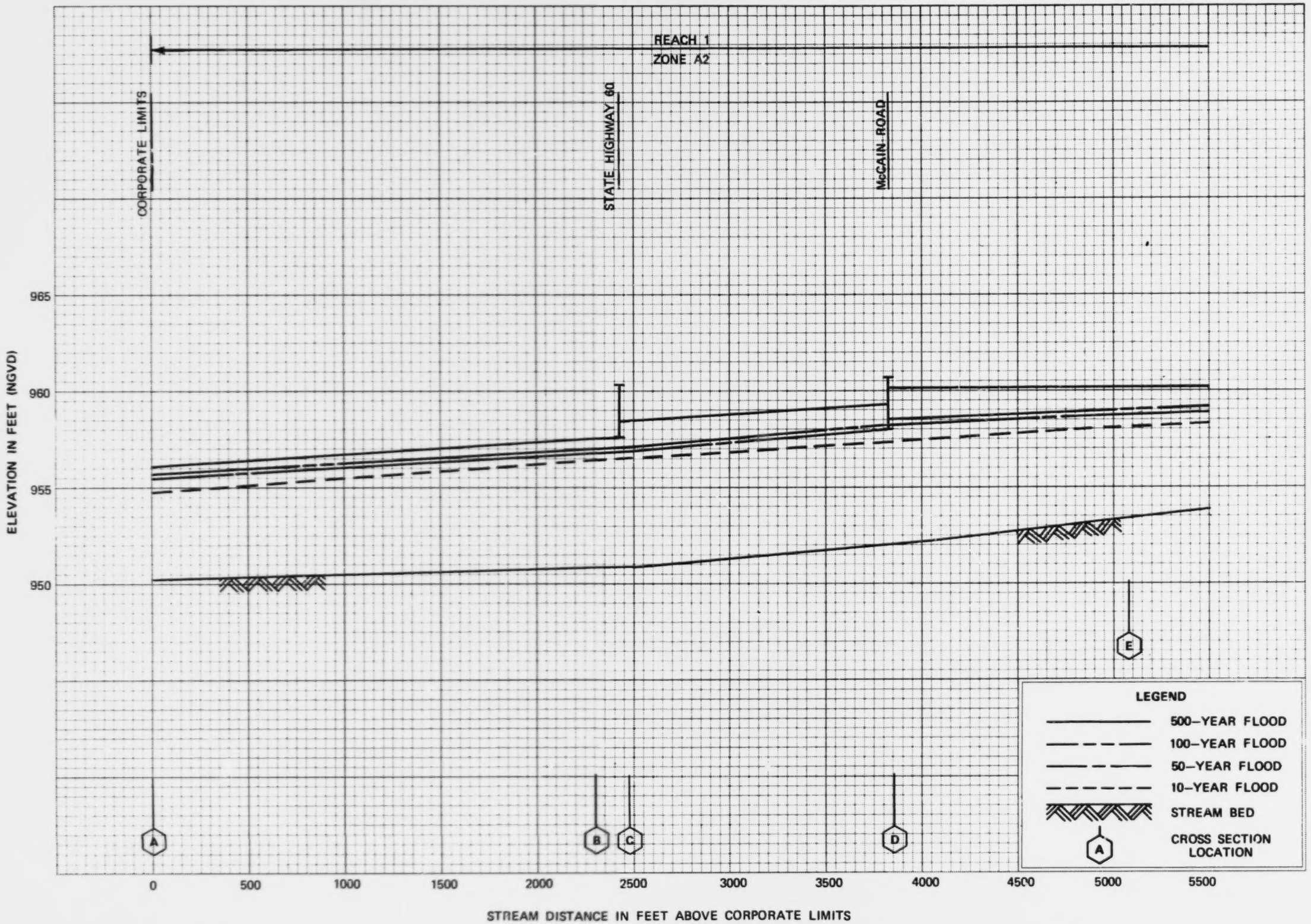

FLOOD PROFILES

MC CAIN DRAIN

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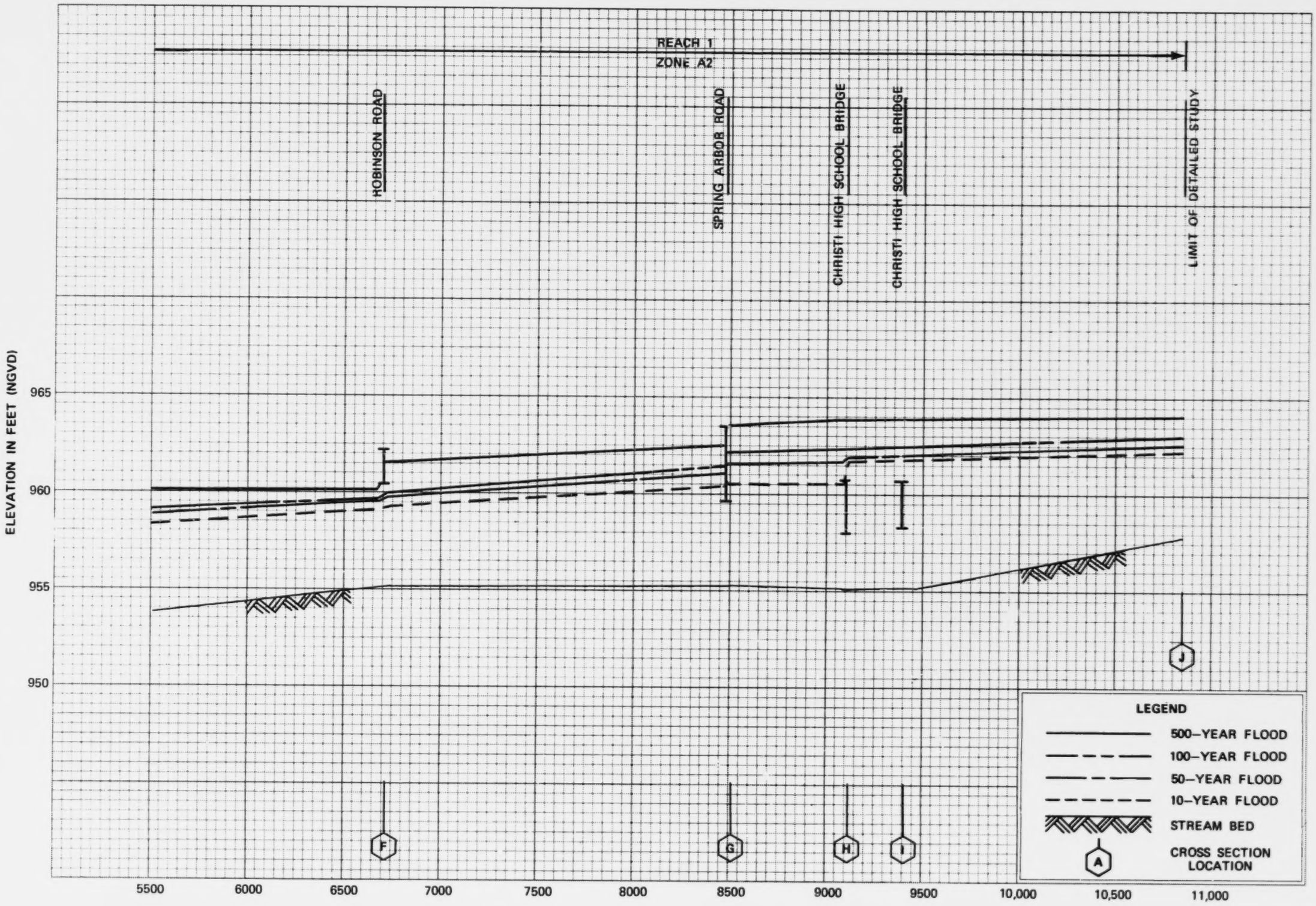

FLOOD PROFILES

MC CAIN DRAIN

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TOWNSHIP OF SUMMIT, MI
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